FEMORAL ANEURISM

CURED BY DIRECT COMPRESSION, WHILE THE PATIENT WAS TAKING ACTIVE EXERCISE; DEATH FROM PERITONITIS SIX YEARS AFTERWARDS.

WITH A PLATE OF THE ANEURISM AND ENLARGED ARTERIES.

BY

BUCKMINSTER BROWN, M. D.

SURGEON OF THE HOUSE OF THE GOOD SAMARITAN.

WITH AN ACCOUNT OF THE POST-MORTEM APPEARANCES.

BY

HENRY H. A. BEACH, M. D.

ASSISTANT DEMONSTRATOR OF ANATOMY IN HARVARD MEDICAL SCHOOL.

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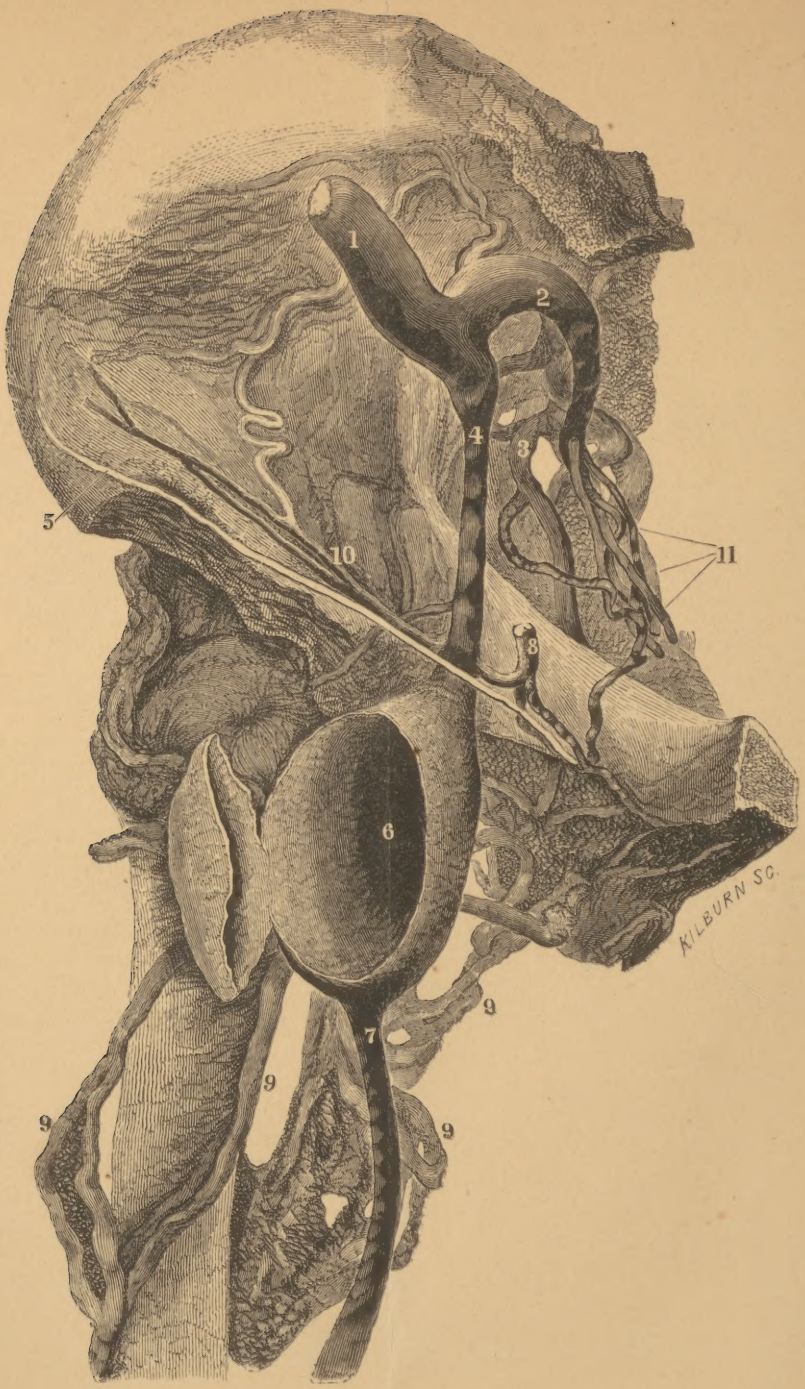
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FEMORAL ANEURISM CURED BY DIRECT COMPRESSION, WHILE THE PATIENT WAS TAKING ACTIVE EXERCISE; DEATH FROM PERITONITIS SIX YEARS AFTERWARDS.[1]

[WITH PLATE.]

BY BUCKMINSTER BROWN, M. D.,
Surgeon of the House of the Good Samaritan.

WITH AN ACCOUNT OF THE POST-MORTEM APPEARANCES.

BY HENRY H. A. BEACH, M. D.,
Assistant Demonstrator of Anatomy in Harvard Medical School.

THE specimen of femoral aneurism which we have here this evening represents the completion of the history of a case treated and cured by immediate compression; a portion of this history was published in March, 1866. The specimen has been beautifully injected and prepared by Dr. Beach, by whom it will be shown.

This case is, so far as I have been able to ascertain, the only one on record in which the closure of the artery, although commenced while the patient was recumbent, progressed and was completed while he was taking active exercise, and attending for the greater portion of the time to his business, walking and riding to and from his store, etc.

The aneurism is fusiform in shape, and involves all the coats of the artery. The published report above alluded to was as follows:[2] —

"Mr. E. S., a healthy, muscular man, about thirty-eight years of age, called upon me July 11, 1863. Ten days previously he had first noticed a throbbing in the right groin. This had been gradually increasing. I found a pulsating tumor, about three and a half inches in diameter. The swelling was soft, and the fluid apparently just beneath the skin. Pressing with the finger, the posterior walls could be felt, the end of the finger being surrounded by pulsating fluid. The diagnosis was aneurism of the femoral artery at its exit from the abdomen. Remembering that a suppurating gland in the vicinity of a large artery has sometimes deceived surgeons of even the largest experience, I decided not to alarm the patient, but to await the result of a second examination.

"Upon a second examination, a few days afterwards, I found the swelling had increased and the throbbing much augmented. The finger pressed upon the tumor was forcibly lifted with every pulsation of the

[1] Read before the Boston Society for Medical Improvement.
[2] Boston Medical and Surgical Journal, March 15, 1866.

heart. Dr. J. Mason Warren examined the patient July 31, and coincided in the diagnosis, and a trial of the treatment by immediate pressure was decided upon. The patient was directed to stand and walk as little as possible. About this time his health began to fail, and I advised him to go into the country for a short time, and that while there he should gradually accustom himself to the use of weights upon the tumor. He was directed to lie upon his back, and apply a bag of shot weighing ten pounds. Three times a day the weight was to be removed for an hour, and a bag of ice applied. This treatment was continued two weeks, when the weight was increased to fifteen pounds. At the expiration of another two weeks the patient returned to Boston. During these four weeks Mr. S. had obeyed implicitly my directions. The weight had been kept on the tumor day and night. It had caused a good deal of pain, and he had consequently obtained but little sleep. I found, on his return, there was a change for the better; less throbbing, and the tumor somewhat diminished in size. Three times a day he had walked from the bed to the lounge, and this was all the exertion he had made. He was now directed to lie persistently upon his back, and to make no voluntary effort whatever. He was carefully lifted upon the lounge in the morning, and at night carried to his bed. Ice was used for an hour in the night as well as in the day; as a change from the weight, this was a great relief. This course was pursued for some weeks, when, at the suggestion of Dr. Warren, I commenced using cannon-balls, in order to concentrate the weight more accurately over the tumor. The first ball used weighed twelve pounds. In a short time this was doubled, a ball weighing twenty-four pounds being applied. These balls were inclosed in a bag, which was secured to his person in such a manner that it could not slip. The twenty-four pounder at first could be borne only from two to five minutes. The bag of shot, the twelve-pound and the twenty-four pound balls were used alternately for another four weeks. The result was encouraging. The pulsation was less forcible, the tumor had lessened and its parietes had become hard and comparatively inelastic, and the artery below the aneurism was evidently diminishing in calibre. The patient was now able to bear the weight of the twenty-four pound ball constantly during the day, except when relieved by the application of ice. His diet was carefully regulated; meat was interdicted, and only light, farinaceous food allowed. About this time I discovered a small pulsating tumor on the top of the right foot, at the base of the metatarsal bone of the great toe — probably a dilatation of the arteria dorsalis pedis. This was cured in a short time by pressure with a piece of India-rubber and a bandage. In order to check circulation in the limb as much as possible, I applied a bandage from the toes to the groin. This afterwards gave place to a firm, silk, elastic stocking, two inches less in circumference than the leg, extending likewise

from the toes to the groin. I also had a strong leather belt made to pass round the hips, with a groin strap. By this means I was able to produce powerful pressure upon the bag of shot, which was worn during the night.

"This treatment was continued, with little variation, from October, 1863, to June, 1864. The artery below the aneurism was now extremely small and its pulsation scarcely perceptible. The swelling had much diminished in size, had become hard, and its action comparatively feeble. I now decided to continue the treatment which had thus far been attended with so favorable a result, but to apply my pressure in another form, and, if possible, in such a manner as to admit of locomotion. A wide, strong, firm leather belt was made, thoroughly padded, which was fastened tightly around the hips; to this was attached a strap passing from behind the trochanter to buckles over Poupart's ligament. A pad was adapted to the tumor, hard, oblong, and convex, with a block-tin back. This pad was held in position by the strap passing through loops to the buckles. By these means I found I could apply a very considerable amount of force. These straps having been adjusted, I allowed the patient to sit up and walk a short distance each day. At first his legs were very weak; he rapidly gained strength, however, and was soon able to walk out, and in September, 1865, he began to attend to business, walking once a day from the neighborhood of the Boylston Market to Tremont Row. The pad was so accurately adapted to its intended position, and so firmly held there, that motion of the joint did not displace it, and thus a strong pressure upon the tumor was insured, even during active exercise. He continues to wear the belt and pad night and day, never removing it, except when in the horizontal position, and then only for a few moments for the purpose of bathing the part or to dress the excoriations produced by the belt upon the hips. On my last examination, about three weeks since, the artery below the swelling could not be felt, having, so far as could be ascertained, become obliterated by the constant pressure. The tumor pulsated feebly, had become harder, and had little elasticity.

"The patient was upon his back ten months, and has been under surveillance between sixteen and seventeen months; during the first part of this time the pain and weariness wore upon him somewhat. His health, however, continued good, and his digestion was rarely disarranged. After five months he had become accustomed to the treatment, and began to grow fat; and when he left his chamber he found he had gained twenty pounds during his confinement. I had, it is fair to state, an extraordinary patient to deal with. Mr. S. bore pain, continuing night and day for so many months, with a fortitude and even cheerfulness which could not be surpassed.

"The result of the treatment by pressure in this case is certainly satisfactory. The attendant circumstances were such as, from the first,

to indicate an almost hopeless prognosis. The nature of the disease, its situation just beneath Poupart's ligament, must render any operation which might have been attempted exceedingly dangerous. The ligation of the external iliac is an operation certainly not to be undertaken but as a last resort. When, in addition, we consider the aneurismal tendency of the arteries, as indicated by the swelling of this nature on the dorsum of the foot, the aspect of the case was sufficiently discouraging, and a favorable result from an operation could not have been anticipated.[1] To check the flow of blood through the aneurism by pressure applied above was impossible, as the tumor was directly upon the border of the pelvis. The application of immediate pressure in any other way than that employed, as by tourniquet, must necessarily have been attended by disadvantages, and was — after being duly considered — rejected. The course pursued was one which required constant vigilance to guard against excoriation and ulceration of the skin over the swelling, and this, by great care, was prevented. The belt around the hips, which was necessarily tightly strapped in order to obtain a firm purchase for the compressing strap, has from time to time caused sores which have been difficult to heal. There has been no complaint of numbness of the limb, nor any tendency to paralysis. The diseased leg, at the calf, is one and three fourths inches larger than the other."

From March, 1866, the time of the publication of the foregoing paper, compression by means of the pad and straps was continued. I will read a portion of Mr. S.'s memoranda of his case, given in a note addressed to me in 1871. He says, "From January, 1866, to December, 1868, there was no particular change. During that time I was much troubled with soreness caused by the rubbing of the straps. . . . About the middle of December I was taken with a severe pain in the calf of the leg, which afterwards extended through the whole leg. It did not seriously trouble me until the latter part of January (1869). My leg was much swollen at this time, and there was pain in the thigh near the aneurism."

I will here remark that the occurrence of this pain, which was often excruciating, putting the fortitude of even this man of strong endurance to a severe test, received at the post-mortem examination a singularly satisfactory explanation, although it was somewhat difficult to account for at the time. The arteries were injected, and those which entered and nourished the sciatic and anterior crural nerves were found to participate in the general enlargement of all the arteries in the neighborhood. The consequent pressure upon the nerve produced the pain and cramps referred to by the patient. He continues: "The first day of February the pain was very severe, and so continued for several days,

[1] The view of the case stated in the above paper, published nine years since, receives confirmation, if any were needed, from the atheromatous condition of other arteries revealed by the necropsy.

and I was very lame and sore. When the pain came on, the tumor measured five inches across and six inches in length. It now increased in size. . . . From that time until April 1st (1869) I had more or less of the pain, and suffered very much. My general health was much affected. My leg was very weak, so much so that I was hardly able to walk. April 5th I went out of the city, and was gone a week. During that time the pain entirely left me. The tumor was still large, and throbbed a great deal. For the next three weeks I was very comfortable; I had no pain; the throbbing continued as before.

"May 2, 1869. Discovered that the throbbing had stopped.

"May 5th. Dr. Brown examined me, and found the aneurism closed up. The leg was very cold and almost lifeless. He ordered it wrapped in flannel and wadding.

"May 10th. I was examined; was not allowed to walk more than was absolutely necessary.

"May 23d. Dr. Brown and Dr. H. J. Bigelow examined me. No circulation could be found in the ankle, but a slight beating in the top of the foot.

"July 31st. Examined by Dr. Brown. A slight beating was found inside the inner ankle; no beating in the popliteal artery; tumor very much reduced, as was also the swelling of the leg.

"September 22d. Examined; all doing well. I was advised to reduce the pad about one half.

"October 28th. Tumor further reduced. A still further reduction of the pad and straps.

"December 14th. Dr. Brown made a full examination; thought me entirely well. The tumor was very much reduced. I was allowed to walk all I felt able. I kept on a portion of the straps and pad during the winter.

"April 28, 1870. Left off all my straps, and have been without ever since.

"May 2, 1870. First anniversary of the closing of the artery.

"February, 1871. Through the summer of 1870 I got along very comfortably. My leg was weak, and troubled me at times, especially after walking; had something like cramp in it.

"The tumor has diminished in size. It now (1871) measures three and a half inches across and three inches in length, or up and down; it is but little raised. My leg is much stronger; I can take quite long walks with but little discomfort."

From the time of leaving off the compression-pad (May, 1869) to the date of his death, Mr. S. had no further inconvenience from his imperforate femoral. On Sunday, February 7, 1875, he was not well, but was at his place of business on Monday morning. On the evening of that day he had a chill, and on Tuesday morning I was called to him.

He was then suffering severe distress in the epigastrium, with nausea. This was somewhat relieved in the afternoon; but the next day the pain returned with great intensity in the region of the bladder, and by the 11th symptoms of peritonitis were well pronounced, and continued, uninfluenced by remedies, except in the complete relief of pain by opiates, until his death, which occurred on the 13th.

Dr. Beach made the post-mortem examination, and found the usual results of acute peritonitis; he was enabled to procure the parts involved in the old arterial disease. There were no indications that this had any connection with the acute complaint which proved fatal.

The ultimate success which attended the treatment of the aneurism was undoubtedly due in part to the fact that the compression at first was not sufficiently forcible to entirely occlude the artery, but was such as gradually to diminish its calibre and to allow of the progressive enlargement of the neighboring vessels and the accommodation of the surrounding parts to the new state of things. Likewise the process of nature in producing a spontaneous cure was by this course more strictly imitated. Holmes says[1] that the formation of fibrinous coagulum "seems to require for its commencement a diminution of the circulation, but not its entire stoppage; indeed, it sometimes seems to go on less readily when the stream is stopped altogether." The cure of aneurism of other arteries by digital or other means of compression is of frequent occurrence. When the tumor is situated at or near the origin of the femoral, such a result is more rare. Rapid compression, under chloroform, has recently been attended with some success. Mr. Timothy Holmes, in his lectures published in *The Lancet*, refers to cases in which this method has been applied with a view of curing the aneurism at a single sitting. The risks from gangrene, etc., are stated. In his *résumé* he says, "This record of cases is no doubt extremely encouraging as far as relates to the forms of disease which do not admit of any other operative treatment, except that by ligature of the abdominal aorta, which hitherto has always failed, or of the common iliac, from which only one fourth of the patients operated on have recovered. . . . The total compression of the common or even the external iliac must involve great risk of fatal contusion of the viscera or the peritoneum."[2]

In the case now under consideration the patient was a stout, muscular man, with a considerable amount of adipose tissue. The impossibility of applying digital or instrumental compression to the external or common iliac under these circumstances was too evident to require serious deliberation. The contra indications to an attempt at cure by ligating the external iliac have been already stated.

Autopsy. — The abdomen was opened thirty-six hours after death, and a large collection of thin pus was found in the peritoneal cavity.

[1] Holmes's Surgery.

[2] The Lancet, October, 1874.

The intestines were glued to each other and to the abdominal walls by patches of lymph. The peritonitis seemed to be general, and there was no evidence of its connection with the aneurism. The sciatic, gluteal, obturator, and femoral arteries exhibited patches of calcification. The abdominal viscera, with the exception of their peritoneal surfaces, were healthy. The thorax and head were not examined, as only sufficient time remained for the injection of the arteries in the region of the aneurism and the removal of the specimen. A colored wax injection was thrown into the common iliac artery, and as shown by the specimen it entered the thigh by the internal iliac artery, its branches, and their anastomoses. On dissection the aneurism proved to be fusiform in character, and caused by a gradual expansion of the common and superficial femoral arteries, commencing directly under Poupart's ligament and increasing until its diameter measured two inches; it then as gradually diminished until its calibre corresponded with that of the superficial femoral, the long axis of the tumor measuring two and a half inches. The three coats of the artery could not be satisfactorily demonstrated, owing to their consolidation by the long-continued compression. The cavity made by the arterial expansion was completely filled by a mass of clot, somewhat adherent to but easily separated from its walls. It presented no appearance of lamination on section, but instead, a firmly condensed tissue, irregularly distributed throughout the friable portion, and inclosing the latter in small cavities. The former predominated, and under the microscope presented some indications of organization. The communication which had existed between the artery at either extremity of the aneurism had become entirely closed. No communication between the interior of the aneurism and the deep femoral was detected, though carefully looked for. The femoral vein had been completely closed by the pressure of the aneurism and the means employed for its cure. The first half-inch of the external iliac artery was filled with the injecting material; beyond that point the vessel had dwindled to the usual size of the circumflex iliac. I made an incision into it at the middle of the vessel, to ascertain if it was occluded, and found that a very fine probe passed upward and downward for half an inch; beyond that point it was apparently solid. The superficial femoral was empty, and a probe entered five inches below the aneurism passed readily to within an inch of the latter, but there it met a solid body (the occluded vessel), and would not enter the aneurism. The internal iliac and its anastomosing branches were very much enlarged, the calibre of the vessels varying from twice to three or four times their usual size. A glance at the specimen, of which the plate gives an anterior view, shows that the main blood supply to the limb came from the gluteal, sciatic, and obturator arteries. The first branch below the bifurcation of the common iliac is the ilio-lumbar, commonly given off from the posterior

division of the internal iliac, which, after sending branches to the psoas and iliacus muscles, forms an anastomosis with the circumflex iliac. The latter was filled from the anastomosis to its origin from the external iliac, where the injecting material stopped. The gluteal, after giving off the nutrient artery to the hip-bone, and the lateral sacral, emerged from the pelvis, and divided as usual into superficial and deep branches; the former anastomosing with the sciatic and posterior sacral arteries, the latter terminating in close proximity to the ascending branches of the external circumflex and the circumflex iliac. All the branches of the sciatic were enlarged, and although the anastomoses with the internal circumflex and perforating arteries could not be exactly determined, the close relation of its branches with a large number of branches from the last-named vessels in and between the muscles of the posterior femoral region suggested the probability of their existence. An interesting fact in connection with a varicose appearance and enlargement of the comes nervi ischiadici was the intense pain in the sciatic nerve and its branches, alluded to by Dr. Brown in the history of the case. A similar condition, but not to such an extent, existed in a vessel lying upon the anterior crural nerve, whose branches were also the seat of severe pain. The superior and inferior vesical arteries, and the middle hæmorrhoidal, could be traced as far as their respective viscera, and nothing worthy of note was observed in connection with them. The obturator, after giving off large muscular branches to the interior of the pelvis, sent a large anastomotic branch over the pubic bone to the epigastric branch of the external iliac, and terminal and anastomotic branches through the obturator foramen to the obturator externus muscle, and the internal circumflex and sciatic arteries. The epigastric artery was filled to its origin by its anastomosis with the obturator. The internal pudic, beyond its enlargement, presented nothing worth mentioning. The aneurism closed the origin of the deep femoral, and the latter was filled through its anastomoses with posterior vessels of the thigh. The origins of the external pudic, superficial epigastric, and circumflex iliac arteries were closed by the aneurism.

EXPLANATION OF PLATE.

1. Common iliac artery.
2. Internal iliac artery.
3. Obturator artery sending a branch to communicate with the epigastric.
4. External iliac artery.
5. Poupart's ligament.
6. The interior of the aneurism; shown by partially detaching and turning to one side its anterior wall and removing the clot.
7. Superficial femoral artery.
8. Epigastric artery.
9. Circumflex, perforating, and sciatic arteries, with communicating branches.
10. Circumflex iliac artery.
11. Visceral branches of the internal iliac.

The preparation from which the plate was made has been contributed to the museum of the Harvard Medical School.